

## Ground cover, provided with vegetation.

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**Abstract of EP 0475489 (A1)**

Ground cover , provided with vegetation like moss, grass, and/or herbs for covering grounds and groundworks like (central) verges, roofs, etc. consisting of a nutrient medium substrate (1) held together by a structure and with vegetation (2) grown thereon, and covered at the underside by a root-obstructing fleece (4), which is permeable to water. Between the ground to be covered and the ground cover a moisture regulating layer (3) adjusted to the soil conditions is applied. This moisture regulating layer can be a buffer layer, capable of absorbing moisture and retaining it. The buffer layer may also consist of a reinforced water buffering packet. Said ground cover can comprise a fine-pored fleece mat (9, 10) of plastic material and a roughly woven mat of hard plastic thread like polyester, sprayed full with a fine porous plastic foam.

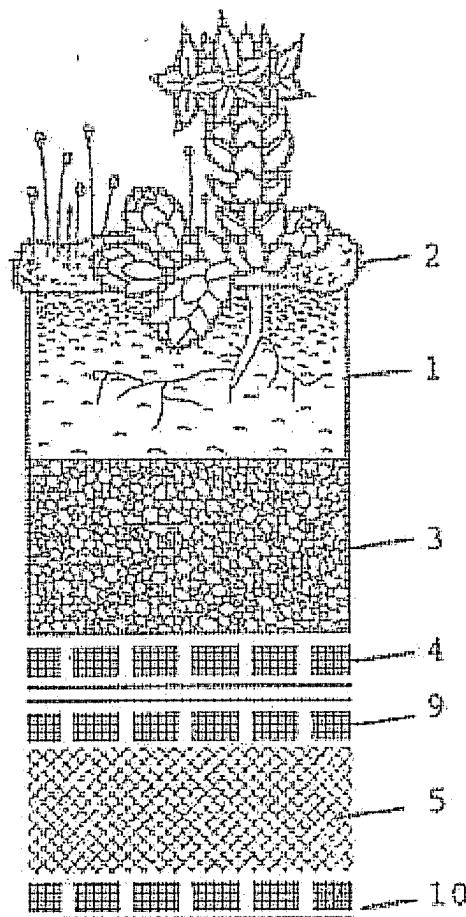


Fig. 1

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### (54) Ground cover, provided with vegetation.

(57) Ground cover, provided with vegetation like moss, grass, and/or herbs for covering grounds and groundworks like (central) verges, roofs, etc. consisting of a nutrient medium substrate (1) held together by a structure and with vegetation (2) grown thereon, and covered at the underside by a root-obstructing fleece (4), which is permeable to water. Between the ground to be covered and the ground cover a moisture regulating layer (3) adjusted to the soil conditions is applied. This moisture regulating layer can be a buffer layer, capable of absorbing moisture and retaining it. The buffer layer may also consist of a reinforced water buffering packet. Said ground cover can comprise a fine-pored fleece mat (9, 10) of plastic material and a roughly woven mat of hard plastic thread like polyester, sprayed full with a fine porous plastic foam.

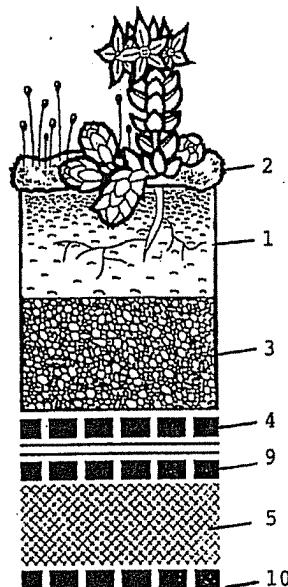


Fig. 1

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The invention relates to a ground cover, provided with vegetation like moss, grass and/or herbs for covering grounds and groundworks like (central) verges, roofs etc., consisting of a nutrient medium substrate held together by a structure and with vegetation cultivated thereon, and covered at the underside by a root-obstructing fleece, which is permeable to water.

Such ground covers are well known. According to the European patent 127839 such a ground cover consists of a structure layer, formed by a so-called loop mat (Schlingmatte), filled up with a structure-stable substrate, consisting of earth, gravel, rubble, minerals, lime, which forms the actual nutrient medium and in which the vegetation is sown. The fleece closing off at the underside helps to support the mutual connection and further serves as moisture buffer as well as root interrupter for weed roots. The lastmentioned is especially important, when such a ground cover is used on the ground; in that case the roots of germinating weeds, the seeds of which have landed on the ground cover, can hardly penetrate the fleece towards the surface of the earth, whereby the weeds will finally die of too little water absorption.

Such ground covers are available in the form of rollable mats, they serve both as cover for the ground and as cover for a roof. In lastmentioned case according to EP 202346 it is suggested to provide the underside with a heat insulating supporting layer.

Although such ground covers designed as vegetation mats have in practice proven their use, situations can arise, in which such a cover will not function optimally. If the ground cover is applied onto a relatively wet earth surface, the chance exists, that too much moisture penetrates from the bottom, whereby the vegetation of the ground cover is exposed to too much moisture and will rot away. Besides, damage to the underlying fleece can arise, resulting in the fact that weeds can develop easily on the ground cover, which requires much extra maintenance, something which is highly undesirable when it concerns for example ground covers for a central verge of a traffic route.

On the other hand, with dry grounds and with roofing situations can arise, whereby the ground cover can not retain enough water and will dry up. This can be prevented by regular irrigation, which can however, for example in case of roofing, be rather laborious. The object of the invention is to intercept the problems with such ground covers as much as possible.

To that end, the invention provides for a ground cover as described above, characterized in that between the ground or underground to be covered and the ground cover a moisture regulating layer adjusted to the soil conditions is applied.

In case of a ground cover destined for a dry ground, the moisture regulating layer is a buffer layer, capable of absorbing moisture and retaining it. With that, the buffer layer can effectively be formed by a fine-pored fleece mat of plastic material. This is capable of absorbing superfluous moisture from the ground cover and return it as needed. Particularly effective the buffer layer can consist of a reinforced waterbuffering packet. According to a preferred embodiment of the invention the buffer layer consists of a roughly woven mat of hard plastic thread like polyester, sprayed full with a fine porous plastic foam. Such a buffer packet is particularly able to absorb water and give it up again, and moreover forms a strong, protecting lower layer, which is proof against a certain load. Effectively, this buffer layer can be closed off, at least at the bottom side by a water absorbing plastic fleece. Such a design has the added great advantage, that in inclined or even vertical position no water will run out sideways from the buffer layer, but that this remains kept in the plastic foam. By that, a similar embodiment is especially suitable as roofing for pitched roofs and for covering of concrete bunkers and the like.

In case the ground cover is intended for a water retaining ground, the invention is characterized in that the moisture regulating layer is a drainage layer. With that, the drainage layer can effectively be formed by a roughly woven mat of hard plastic thread like polyester. Such a mat forms a spacer as it were between ground cover and groundwork, capable of letting superfluous water from the upper covering through, but not capable of sucking up water from the ground. Thereby this mat can effectively be closed off at two sides by a root-obstructing plastic fleece. This closure prevents accumulation of material inside the mat, as a result of which the draining effect could become lost.

The invention will be further explained in the following by way of embodiments referring to the drawing. In the drawing, each time in schematical side view, is shown by:

Fig. 1 a ground cover with moss-herbs vegetation for water retaining grounds,

Fig. 2 a second embodiment of a ground cover with grass-herbs vegetation for water retaining grounds,

Fig. 3 a ground cover with moss-herbs vegetation for dry grounds, and

Fig. 4 another embodiment of a ground cover with moss-herbs vegetation for dry grounds.

In the figures corresponding elements are indicated by the same reference numbers.

In Fig. 1 a first embodiment of the invention is shown; this concerns a ground cover for a water retaining ground, for example intended for covering

a verge. This ground cover consists of a nutrient medium 1, consisting of constituents like earth, sand, lime and minerals. On this nutrient medium substrate is a vegetation 2, which in the shown embodiment consists of moss and herbs. Beneath nutrient medium substrate 1 lies a nutrient medium or ground substrate 3 kept in structural connection, consisting of earth, gravel, lime etc., which forms a combined agglomerate together with layer 1 and is applied in a structure maintaining layer, for example a so-called loop mat as described in European Patent 172839. This layer 3 has a moisture buffering action. When the upper layer becomes too dry, moisture kept in this ground substrate is returned, possibly with minerals dissolved therein. This ground substrate is closed off at the bottom by a so-called root-obstructing fleece 4, formed by a fine fleece of unwoven plastic textile, which is able to let water through, while weed roots that could otherwise shoot through, are stopped.

Below the so formed ground cover lies a draining layer 5, consisting of a very roughly woven mat of hard plastic thread, covered at top and bottom by a fine-woven fleece of plastic textile 9 and 10 respectively, that are water absorbing and permeable.

With the thus formed ground cover, intended for being laid onto a ground water containing groundwork, for example a verge or central verge, the vegetation system is self-maintaining, that is, the nutrient medium 1 and the ground substrate 3 see to it, that enough moisture is present for the vegetation of mosses and herbs. Moss already has a moisture retaining effect on its ground c.q. the nutrient medium, and the ground substrate serving as a water buffer sees to it, that in case of dryness water still can be supplied from below. The fine fleece 4 serves as so-called anti-root cloth, to prevent suddenly upcoming weeds with their roots from shooting through downwards. As is known, weeds need more moisture and more space than the vegetation of moss and herbs especially selected for this ground cover, and thanks to this anti-root cloth possible weed roots can not shoot through so that the weeds do not get the chance to develop.

An essential part of the above described structure is constituted by the draining layer 5, which forms as it were a spacer between the ground cover lying on top and the ground.

Since this draining layer has very coarse openings, it forms an excellent draining layer, through which superfluous water from the ground substrate 3 can flow out downwards, while on the other hand superfluous water from the subsoil will never be able to rise, since the draining layer can not present capillary action. This draining layer 5 is closed off at top and bottom sides with closing

fleeces 9 and 10 to prevent material from the subsoil or from above from penetrating the draining layer itself with in the most extreme case the result being that this layer instead of draining would absorb water by the obtained capillary action. Particularly suitable material for this draining layer is so-called Enkadrain P32\* double-sided fleece, which is commercially available.

In Fig. 2 an embodiment for a ground cover with grass and herbs is shown. Like in Fig. 1 there is again a nutrient medium 1 kept in structural connection, with on it the vegetation 2 of grass and herbs. In this case, there is no ground substrate beneath the nutrient medium 1, but immediately an anti-root cloth 4, while a draining layer 6 has been applied beneath the anti-root cloth 4, which layer consists of ribbed fleece material, capable to retain a certain amount of water and to drain excess water. A suitable material for such a draining layer 6 is for example Hate-Vlies type L206\*, a commercially available, ribbed material.

In case of the embodiment of Fig. 2, in contrast to Fig. 1 there is no absolute insulation in relation to the ground, which among other things is related to the fact, that a grass plantation needs more water than a moss plantation. For the rest the function is principally the same, be it, that the draining layer 6 performs the function of buffer layer at the same time.

Fig. 3 shows a ground cover with moss-herbs vegetation, which like in Fig. 1 has a nutrient medium 1 kept in structure connection with on it the moss-herbs vegetation 2 and underneath a ground substrate 3 kept in structure connection, with moisture buffering action and also serving as mineral source and closed off by an anti-root cloth 4. Underneath lies a double, strongly water buffering fleece layer 7, for which for example two layers of Hete-Vlies type L206\* can be used. This double fleece layer has an excellent water buffering action, with which it is guaranteed, that there will always be a sufficient excess of water, so that also in cases of dryness water can still be passed through the ground substrate to the nutrient medium and thus the vegetation. The water buffering double fleece layer 7 is closed off at the bottom bij a fleece 10, which is root-obstructing. In this case, the ground 11 is dry, and a such like ground cover is suitable for being laid onto a groundwork of sandy ground or stone. It can also serve as cover for roofs.

In Fig. 4 a second embodiment for a ground cover for dry groundworks is shown. Regarding the parts 1, 2, 3 and 4 it substantially corresponds to the embodiment of Fig. 3. The essential difference however is the water buffering beneath. Instead of the double fleece layer 7, use is made of structure 8, consisting of fine porous plastic foam, which was

sprayed into a roughly woven mat of hard plastic thread. This structure is closed at the bottom by a permeable and sealing fleece 10. Here, the ground 11 is a dry ground as well, and the described construction is particularly suitable for covering roofs and bunkers. It has been found, that such a combination of porous foam in a structure mat loses little or no water at all at the sides, so that such a ground covering can not only be applied horizontally, but slanting under a strong slope as well. This makes such a ground cover pre-eminently suitable for roofs and for bunker coating with sloping walls. In practice it has proved to be very efficient to use said Enkadrain P32(\*) sprayed full with so-called Gardenfoam RG30<sup>®</sup> as a structure mat. With such a ground cover a moisture supply for the internal system is guaranteed even with a relatively long period of dryness.

Although in the above the invention is described by means of four embodiments, it will be obvious that numerous variations are possible, without falling outside the scope of the invention.

### Claims

1. Ground cover, provided with vegetation like moss, grass, and/or herbs for covering grounds and groundworks like (central) verges, roofs, etc., consisting of a nutrient medium substrate held together by a structure, and with vegetation cultivated thereon, and covered at the underside by a root-obstructing fleece, which is permeable to water, **characterized in that** between the ground or underground to be covered and the ground cover a moisture regulating layer adjusted to the soil conditions is applied.
2. Ground cover according to claim 1, intended for a dry ground, **characterized in that** the moisture regulating layer is a buffer layer, capable of absorbing moisture and retaining it.
3. Ground cover according to claim 2, **characterized in that** the buffer layer is formed by a fine-pored fleece mat of plastic material.
4. Ground cover according to claim 2, **characterized in that** the buffer layer consists of a reinforced water buffering packet.
5. Ground cover according to claim 4, **characterized in that** the buffer layer consists of a roughly woven mat of hard plastic thread like polyester, sprayed full with a fine porous plastic foam.
6. Ground cover according to claim 5, **character-**

**ized in that** the buffer layer at least at the bottom is closed off by a water absorbing plastic fleece.

5 7. Ground cover according to claim 1, intended for a water containing ground, **characterized in that** the moisture regulating layer is a draining layer.

10 8. Ground cover according to claim 7, **characterized in that** the draining layer is formed by a roughly woven mat of hard plastic thread such as polyester.

15 9. Ground cover according to claim 8, **characterized in that** the mat is closed off at two sides by a permeable plastic fleece.

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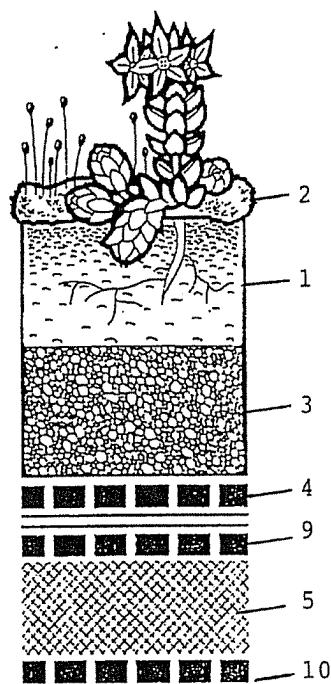


Fig. 1

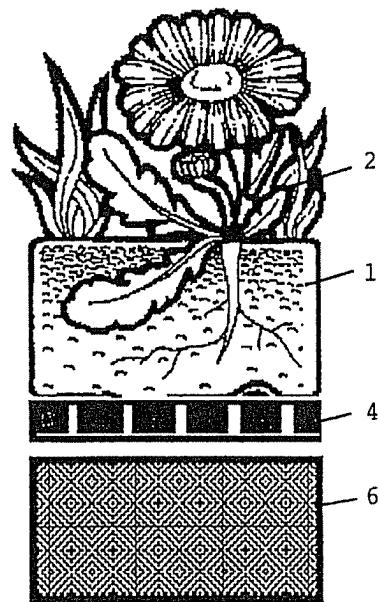


Fig. 2

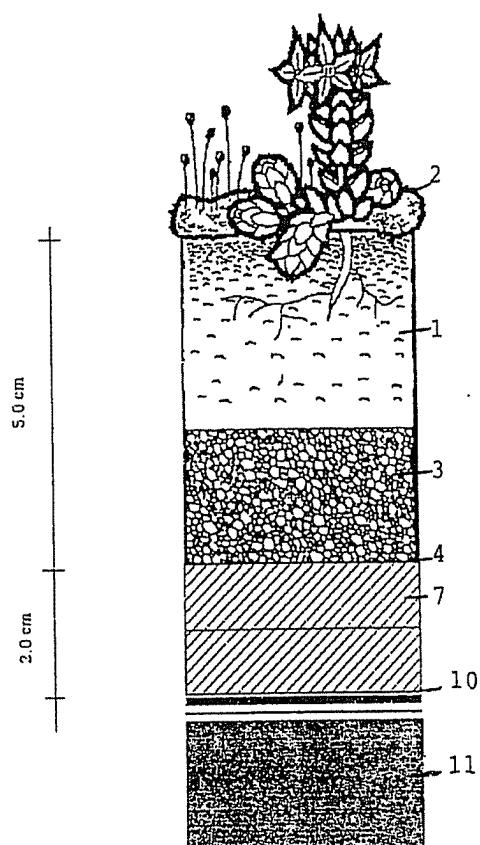


Fig. 3

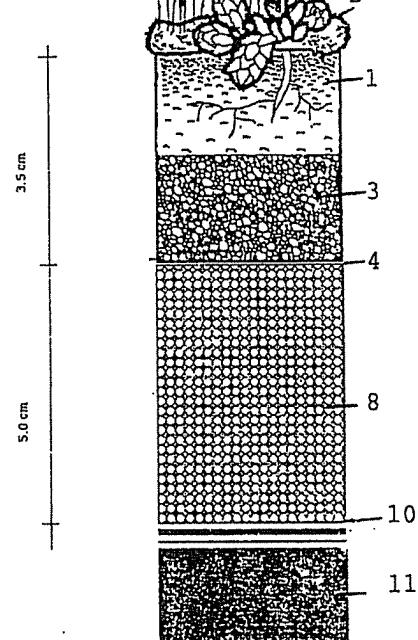


Fig. 4



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## EUROPEAN SEARCH REPORT

Application Number

EP 91 20 2127

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
X	EP-A-0 047 365 (DREFAHL) * page 6, line 18 - page 7, line 24 * * page 9, line 1 - line 6; claim 1; figure 1 *	1,7	A01G1/00 E04D11/00
Y	---	2-4	
Y	DE-A-3 805 069 (BEHRENS) * column 3, line 20 - column 4, line 14; figures 1,2 *	2-4	
A	DE-U-8 606 742 (TECHNOFLOR DEUTSCHLAND) * page 7, paragraph 2 - page 8, paragraph 2; figure *	1,5	
A	DE-A-3 328 110 (ERNST) * page 7, paragraph 2 - page 8, paragraph 4; figures 1-3 *	1,2,7	
A	FR-A-2 006 203 (NAUVE) * claims 1,7; figures *	5,8	
	-----		TECHNICAL FIELDS SEARCHED (Int. Cl.5)
			A01G E04D E01C E02B
<p>The present search report has been drawn up for all claims</p>			
Place of search	Date of completion of the search	Examiner	
THE HAGUE	21 NOVEMBER 1991	HERYGERS J.J.	
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